Unit 3 – 1

Name:

Factor the GCF from each expression

1. $15x^4 + 3x^5$

a.

2. $16x^2 + 24$

b.

3. $18x^4y^7 + 36x^3y^6 - 42x^5y^5$

c.

4. $3x(x-3) + 2(x-3)$

d.

Not all may be possible.

1. Find two numbers that sum to **8** and have a product of **12** _____
2. Find two numbers that sum to **5** and have a product of **6** _____
3. Find two numbers that sum to **5** and have a product of **-14** _____
4. Find two numbers that sum to **-6** and have a product of **12** _____
5. Find two numbers that sum to **16** and have a product of **15** _____
6. Find two numbers that sum to **-4** and have a product of **-21** _____
7. Find two numbers that sum to **1** and have a product of **-56** _____
8. Find two numbers that sum to **-14** and have a product of **40** _____
9. Find two numbers that sum to **0** and have a product of **-25** _____
10. Find two numbers that sum to **8** and have a product of **16** _____

11. **Multiply the following:**

a. $(x+6)(x+3)$

$x^2 + \_\_\_\_\_\ x + \_\_\_\_\_$

Notice: What is the sum of the constants in each binomial above?

Notice: What is the product of the constants in each binomial above?

b. $(x+7)(x-2)$

$x^2 + \_\_\_\_\_\ x + \_\_\_\_\_$

Notice: What is the sum of the constants in each binomial above?

Notice: What is the product of the constants in each binomial above?

12. **FACTOR the following (not all may be factored):**

a. $x^2 + 9x + 18$

b. $x^2 + 6x - 40$

c. $x^2 + 5x - 14$

d. $a^2 - 7a + 6$

d. $m^2 + 8m + 16$

e. $g^2 - 11g + 24$

f. $x^2 + 5x - 6$

g. $x^2 + 5x + 6$

h. $m^2 - 7m - 60$

i. $2g^2 - 14g + 24$

j. $3x^3 - 24x^2 - 60x$

k. $5x^4 - 5x^3 - 30x^2$

13. Special Forms

Name	Formula	Example
Difference of two squares	$A^2 - B^2 = (A+B)(A-B)$	$64x^2 - 9 = (8x)^2 - 3^2 = (8x+3)(8x-3)$
Perfect square trinomials	$A^2 + 2AB + B^2 = (A+B)^2$ $A^2 - 2AB + B^2 = (A-B)^2$	$x^2 - 14x + 49 = x^2 - 2(x \cdot 7) + 7^2 = (x-7)^2$

a. $x^2 - 36$

b. $m^2 + 9$

c. $m^4 - 81$

d. $4b^2 - 400$

e. $4x^2 + 12x + 9$

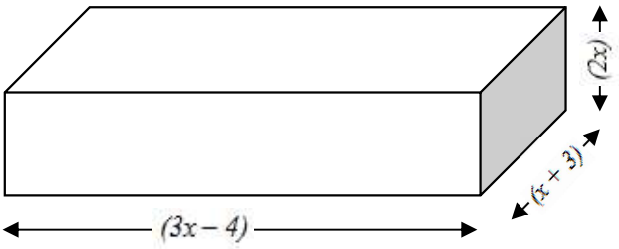
f. $64a^2 - 48a + 9$

g. $121a^8 - 64b^4$

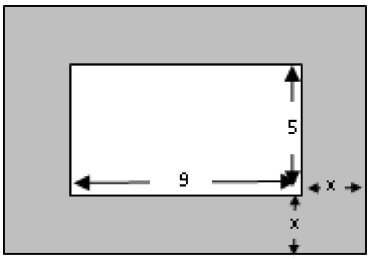
h. $18m^5 + 48m^3 + 32m$

i. $36x^4 - 60x^2y^3 + 25y^6$

14. Find the volume of the rectangular prism shown below



15. Describe the area of the shaded region as a polynomial



15. Multiply the following:

a. $(3x-2)(2x+1)$

b. $(4x+3)(x-3)$

16. FACTOR the following:

a. $6x^2-1x-2$

b. $4x^2-9x-9$

c. $2x^2+7x-15$

d. $3a^2-10a+8$

e. $5g^2-14g+8$

f. $6m^2+10m-24$

g. $6b^3-28b^2+30b$

h. $5m^2+11m-12$

Unit 3 – 2

Name:

Solve the following **QUADRATIC EQUATIONS** using the **SQUARE ROOT METHOD**:

1. $w^2 - 16 = 0$

2. $2y^2 - 48 = 0$

3. $4m^2 = -196$

4. $(b-2)^2 = 36$

5. $3(x+1)^2 + 2 = 14$

6. $4\left(\frac{1}{2}a+1\right)^2 - 5 = 31$

Solve the following **QUADRATIC EQUATIONS** by **FACTORING & ZERO PRODUCT PROPERTY**:

1. $w^2 - 2w = 24$

2. $t^2 = 8t + 20$

3. $r^2 + 5 = 6r$

4. $x^2 + 2x - 20 = 7x + 4$

5. $(x+2)(x-4) = 4 + 2x$

6. $2x^2 - 5 = 3x^2 + 11 - 10x$

(Continued) Solve the following **QUADRATIC EQUATIONS** by **FACTORING & ZERO PRODUCT PROPERTY**:

7. $2x^2 + 7x - 15 = 0$

8. $4p^2 - 10 = 3p$

9. $3x^2 + 2x - 12 = 3x^2 + 6x$

10. $x^3 - 12x^2 + 32x = 0$

11. $x^2 - 4 = 0$

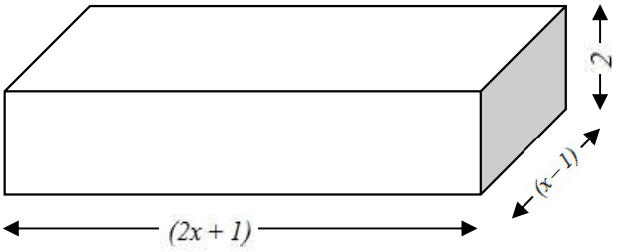
12. $2a^2 + 17a + 8 = 0$

Solve the applications that of **QUADRATIC EQUATIONS**:

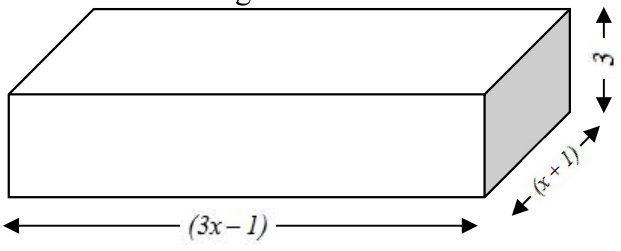
1. The length of a rectangle is 1 cm more than twice its width. If the area of the rectangle is 21cm^2 then what are the dimensions?

2. The length of a rectangle is 3 cm less than twice its width. If the area of the rectangle is 20cm^2 then what are the dimensions?

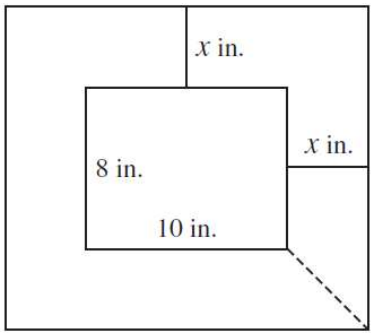
3. The volume of the prism is 28 cubic inches. What is the length of each side?



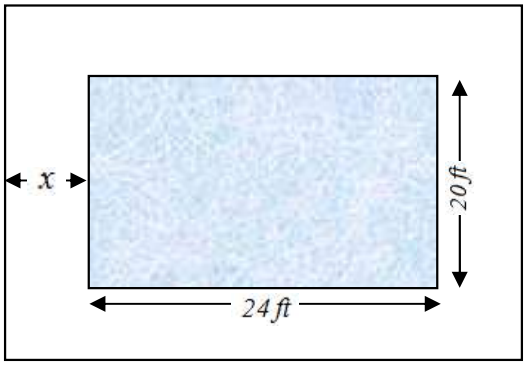
4. The volume of the prism is 45 cubic inches. What is the length of each side?



5. A picture frame is shown at the right. If the entire area of the frame and the picture totals 120 square inches find the width of the frame.



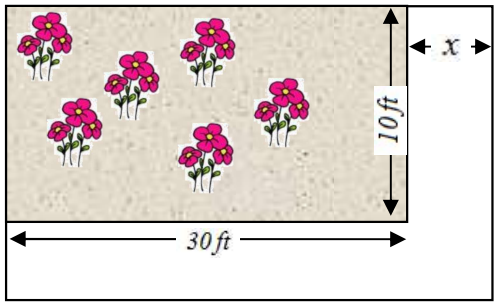
6. A below ground swimming pool is to be constructed in the park. The pool is in the shape of a rectangle with the dimensions of 20' by 24'. A uniform width sidewalk is to be made around the pool. If the contractor says that he has enough concrete to create 300 ft^2 of sidewalk. What is the maximum width of the sidewalk around the pool?



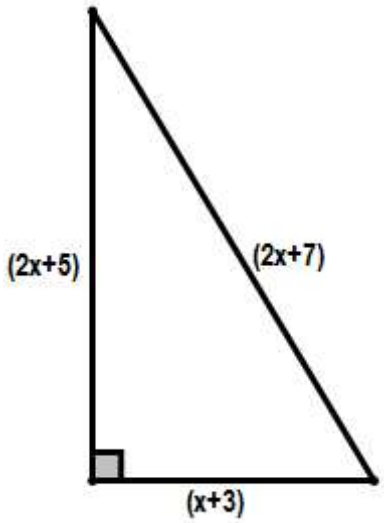
7. The product of two consecutive positive integers is 132. Write an equation to model the situation and find the two integers.

8. The perimeter of a rectangle is 42 cm and the area is 80 cm^2. Write an equation to model the situation and find the dimensions of the rectangle.

9. A park is putting in a sidewalk of uniform width to go around two sides of a rectangular garden that is 10 feet by 30 feet. The contractor has enough concrete for 176 ft^2. What is the maximum width of such a sidewalk?



10. A right triangle is shown below. Use the Pythagorean Theorem to determine the lengths of each side.



The Quadratic Formula

Solve the following by quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. $x^2 + 10x - 19 = 0$

2. $x^2 - 12x + 2 = 0$

3. $x^2 + 15x - 8 = 0$

4. $x^2 - 7x - 4 = 0$

5. $2x^2 - 8x - 14 = 0$

6. $3x^2 - 18x - 5 = 0$

7. $2x^2 - 10x - 3 = 0$

8. $3x^2 - 21x - 5 = 0$

Unit 3 – 6

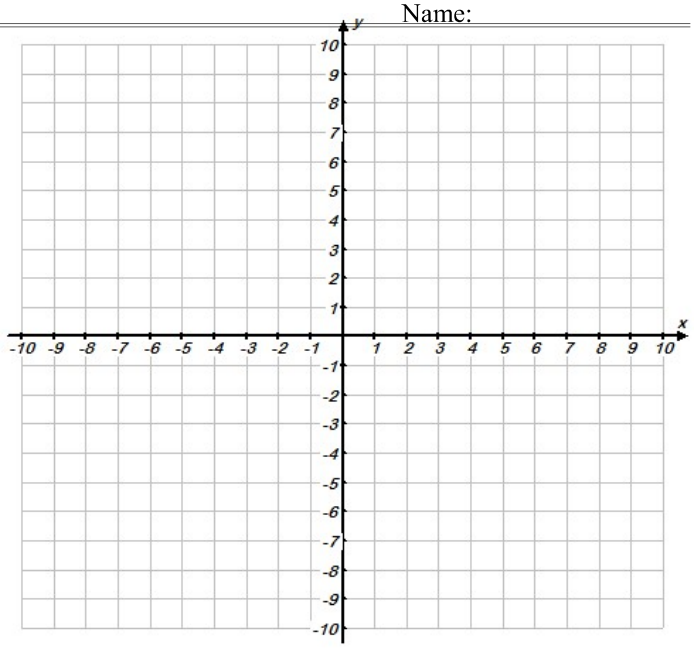
Name:

1. Consider the function: $f(x) = x^2 + x - 6$

   a. What are the zeros of the function (using factoring)?

   b. What is the axis of symmetry of the parabola?

   c. What is the vertex of the parabola (graph the parabola)?

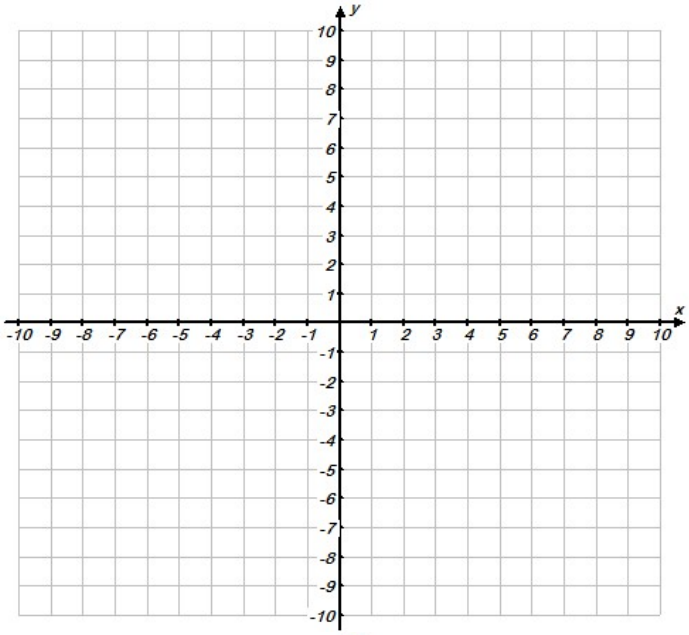


2. Consider the function: $f(x) = -x^2 + 8x - 15$

   a. What are the zeros of the function (using factoring)?

   b. What is the axis of symmetry of the parabola?

   c. What is the vertex of the parabola (graph the parabola)?

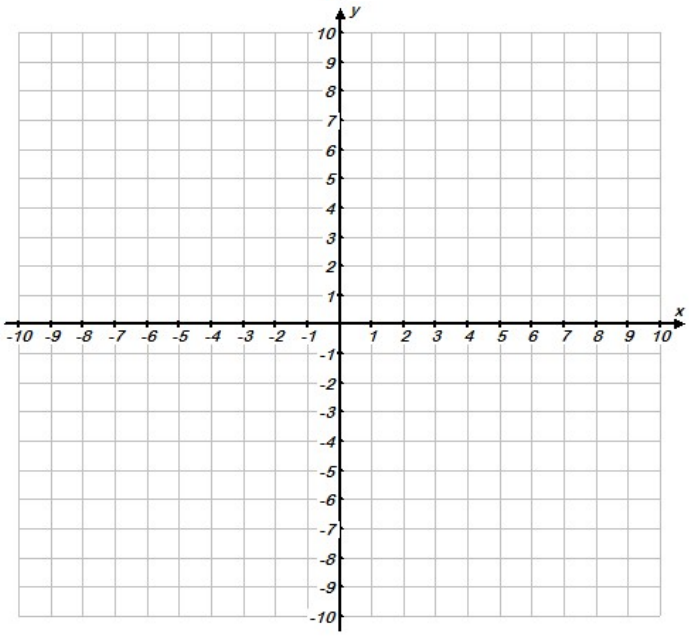


3. Consider the function: $f(x) = 2x^2 + x - 3$

   a. What are the zeros of the function (using factoring)?

   b. What is the axis of symmetry of the parabola?

   c. What is the vertex of the parabola (graph the parabola)?



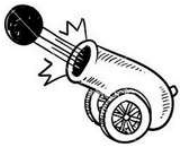
23. The expression $P = -x^2 + 70x - 600$ represents a company's profit for selling x items.

a. What are the break-even point(s) for selling x items (i.e. how many items sold yields a profit of 0?)

b. Is the vertex a minimum or maximum?

c. If the model is accurate, how many items should the company sell to maximize their profit and what is the maximum profit?

24. The expression $h = -16t^2 + 400t + 5$ represents the height of a cannonball t seconds after it was fired. What is the maximum height of the cannon ball and how many seconds did it take to reach its maximum height?



25. The expression $C = x^2 - 44x + 490$ represents the cost in \$1000 of dollars per year that company must spend out of pocket on each employee for health insurance for x number of employees. How many employees should the company hire to minimize their cost of health insurance?

Section 3-7

Name:

1. Solve the following quadratic inequalities in one variable:

a. $x^2 + 3x - 10 > 0$

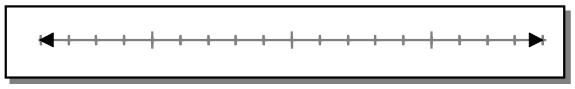
b. $-x^2 + 1x + 12 \geq 0$

c. $2x^2 + 2x \leq 24$

d. $-2x^2 + 14x > 20$

e. $3x^2 + 2x - 8 \leq 0$

f. $2x^2 + 13x - 24 > 0$



12. Describe each of the following as examples of relationships that could be modeled by: LINEAER functions, QUADRATIC functions, EXPONENTIAL functions, or NONE OF THESE.

x	0	1	2	3	4	5	.....
f(x)	5	7	9	11	13	15	.....

x	−1	0	1	2	3	4	.....
g(x)	1	0	1	4	9	16	.....

x	0	1	2	3	4	5	.....
h(x)	2	3	5	9	17	33	.....

x	0	1	2	3	4	5	.....
t(x)	1	3	0	4	−1	5	.....

x	0	1	2	3	4	5	.....
w(x)	5	−1	−3	−1	5	15	.....

x	0	1	2	3	4	5	.....
m(x)	1	1.5	2	2.5	3	3.5	.....

x	0	1	2	3	4	5	.....
b(x)	1	2	4	9	35	712	.....

x	0	1	2	3	4	5	.....
p(x)	−4	−2	4	22	76	238	.....

13. Describe each of the following as examples of relationships that could be modeled by: LINEAER functions, QUADRATIC functions, EXPONENTIAL functions, or NONE OF THESE.

The Sequence: $\{4, 12, 36, 108, 324, \ldots\}$

The Sequence: $\{3, 9, 15, 21, 27, 33, \ldots\}$